Two functions, a control function, e.g., IPControlProc, and a status function, e.g., IPStatusProc, deal with parameter controls of an image processor **502**. Preferably, parameter controls for an image processor **502** each have a unique 4-character tag that is registered to avoid conflict. Parameter control values include two types, a range type and an enumerated list type. Range types of parameter control values are appropriately confined between the minimum and maximum settings for the range. Enumerated list parameter control values assign different enumerated numbers to different settings with a 32-character null terminated string used to provide an ASCII name for each enumerated list number. Examples of parameter controls include sharpening values (range type), color specification control values (range type), and compression control values (enumerated list type).

The control function, IPControlProc, is called by the IPB **520** to control the processing parameters one parameter control at a time and only before a reset function, e.g., IPReset, call for every image to be processed. The status function, IPStatusProc, allows an image processor **502** called by the IPB **520** to determine any parameter kind, values types, factory default parameter setting, and current parameter setting of an image processor **502**. No-operation routines are provided when the image processor does not support any parameter settings, such as in the example of the color correction image processor.

The reset function, IPResetProc, suitably allows IPB **520** to signal an image processor **502** to reset any internal variables used by the image processor **502** before every image is processed. With the color correction image processor example, no operation routines are provided, since no local variables need to be reset. A process function, e.g., IPProcessProc, suitably allows an image processor **502** to process image data one scan line at a time. It is suitably called whenever a data pipeline for the image processor **502** fills up. Thus, the operations for performing the 3×3 matrix manipulation in the color correction image processor example, are specified with the process function. A destruction function, e.g., IPDestroyProc, suitably allows an image processor to deallocate any internal storage allocated at initialization. It is appropriately called when the IPC **500** containing the image processor **502** is being removed. In response to this call, the image processor **502** preferably deallocates internal storage allocated in the initialization function call.

Entry points to these seven functional routines for an image processor **502**, stored in an external data structure, e.g., Functions, as well as the characteristics of the image processor **502**, are suitably stored in an internal data structure, e.g., ImageProc, by the IPB **520**. Once the image processors **502** are defined through the seven functional routines and connected in an IPC **500**, the IPB **520** suitably facilitates image processing operations by managing image buffer I/O, and activation of each image processor **502** as soon as enough input data has been collected. The information for the image data processed is suitably stored in a data structure, e.g., ImageInfo, including raw image size captured by a camera CCD, final processed output image size, bad pixel locations, etc.

MODIFIABLE PARAMETER CONTROL OF IMAGE PROCESSOR IN AN IPC

In a preferred embodiment, the IPB **520** further provides routines to allow exchanges of parameter control settings by an external mechanism, such as a control application **400** (FIG. 4). These functions include parameter control capability and value determination functions, e.g., IPBGetParameterCapability, IPBGetDefaultParameter, and IPBGetParameter. Also included are functions for setting or restoring parameter control values, e.g., IPBSetDefaultParameter, IPBSetParameter, and IPBRestoreParameter. Preferably, for the parameter control value determination functions, an IPC **500** and the number of parameters requested are identified, as well as identification of a pointer to an array of parameter tags, a pointer to a memory location used to store a pointer for the parameter settings returned, and a pointer to a memory location where the number of bytes of parameter control values are stored. Similarly, for the capability determination function, an IPC is specified, the number of parameters requested is specified, a pointer to an array of parameter tags is specified, a pointer to a memory location used to store a pointer for the parameter capability information returned is specified, and a pointer to a memory location where the number of bytes of parameter capability information is stored is specified. Thus, access to the parameter controls managed by an IPC **500** are available, as well as current values, device dependent factory default values, and user-specified default values.

For the parameter control value setting functions, preferably identified by the functions are an IPC, a number of parameter control values to be set, and a pointer to a list of parameter tags and either a current value or a user default value that are to be set by the function. In addition, the set parameter function appropriately allows all parameters not listed in the specified parameter value list to be reset to their user default value when a Boolean variable is set. The restoration function similarly identifies an IPC and a number of parameters to be requested, provides a pointer to an array of parameter tags, and selects the type of parameter defaults, i.e., user-specified or device dependent factory, being reset through a Boolean variable. These functions therefore provide convenient accessibility to allow alteration of parameter control values in an IPC **500**. Greater flexibility for adjusting an image processor **502** within an IPC **500** is advantageously provided.

Although the present invention has been described in accordance with the embodiments shown, one of ordinary skill in the art will recognize that there could be variations to the embodiment and those variations would be within the spirit and scope of the present invention. Accordingly, many modifications may be made by one of ordinary skill without departing from the spirit and scope of the present invention, the scope of which is defined by the following claims.

What is claimed is:

1. A method for allowing variably controlled alteration of image processing of digital image data in a digital image capture device, the method comprising:

forming an image processing chain with two or more image processors, the two or more image processors being stored in memory, wherein said processors are software modules and each performing a particular type of image transformation, to process digital image data;

providing one or more parametric controls that are uniquely identified and within each of the two or more image processors; and

accessing chosen controls of the one or more parametric controls within each of the two or more image processors to modify the two or more image processors for alteration of the image processing.

2. The method of claim **1** wherein the step of accessing further comprises altering a default value of the one or more parametric controls.

3. The method of claim **2** wherein the step of altering further comprises setting the default value to a desired value.

4. The method of claim 2 wherein the step of altering further comprises resetting the default value to a device dependent factory value.

5. The method of claim 1 wherein the step of accessing further comprises determining current values of the one or more parametric controls.

6. The method of claim 1 wherein the step of accessing further comprises determining default values of the one or more parametric controls.

7. The method of claim 1 wherein the step of accessing further comprises determining parametric control capabilities of the one or more parametric controls.

8. The method of claim 7 wherein the step of determining parametric control capabilities further comprises providing values, value types, and device dependent factory default values.

9. The method of claim 1 wherein the two or more image processors further comprise a sharpening image processor and a compression image processor.

10. The method of claim 9 wherein the sharpening image processor provides a sharpening parametric control.

11. The method of claim 10 wherein the sharpening parametric control comprises a range type of control.

12. The method of claim 9 wherein the compression image processor provides a compression parametric control and a color specification control.

13. The method of claim 12 wherein the compression parametric control comprises an enumerated list type of control.

14. The method of claim 12 wherein the color specification parametric control comprises a range type of control.

15. A system for allowing variably controlled alteration of image processing of digital image data, the system comprising:

a digital image capture device, the digital image capture device capable of processing digital image data through two or more image processors, the two or more image processors being stored in memory, wherein said processors are software modules and each performing a particular type of image transformation and having one or more parametric controls that are uniquely identified; and

a central processing unit within the digital image capture device and capable of linking the two or more image processors to form an image processing chain, wherein the central processing unit facilitates access of chosen controls of the one or more parametric controls within each of the two or more image processors for modification of the two or more image processors and alteration of the image processing.

16. The system of claim 15 wherein the two or more image processors further comprise a sharpening image processor and a compression image processor.

17. The system of claim 15 wherein the central processing unit facilitates altering a default value of the one or more parametric controls.

18. The system of claim 15 wherein the central processing unit facilitates setting the default value to a desired value.

19. The system of claim 15 wherein the central processing unit facilitates resetting the default value to a device dependent factory default value.

20. The system of claim 15 wherein the central processing unit facilitates determining current values of the one or more parametric controls.

21. The system of claim 15 wherein the central processing unit facilitates determining default values of the one or more parametric controls.

22. The system of claim 15 wherein the central processing unit facilitates determining parametric control capabilities of the one or more parametric controls, including values, value types, and device dependent factory default values.

23. A computer readable medium containing program instructions for:

forming an image processing chain with two or more image processors, the two or more image processors stored in memory, wherein said processors are software modules and each performing a particular type of image transformation, to process digital image data;

providing one or more parametric controls that are uniquely identified and within each of the two or more image processors; and

accessing chosen controls of the one or more parametric controls within each of the two or more image processors to modify the two or more image processors for alteration of the image processing.

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